

Fig. 1

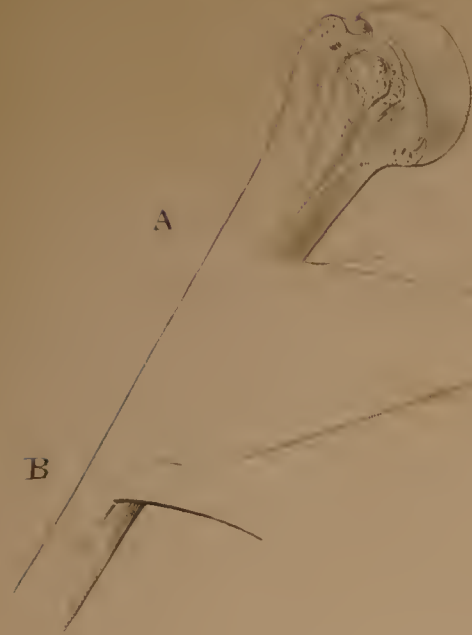


Fig. 2

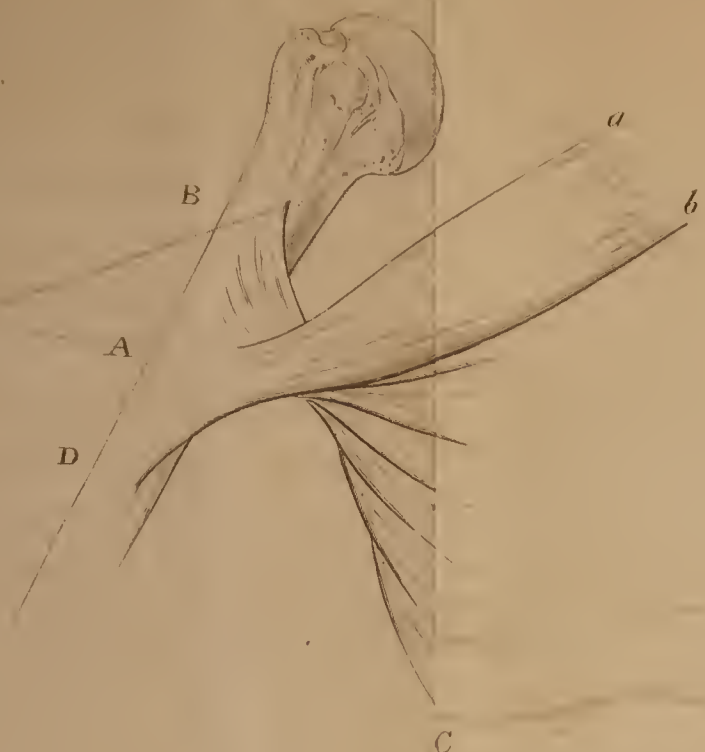


Fig. 3



Fig. 4



Fig. 5

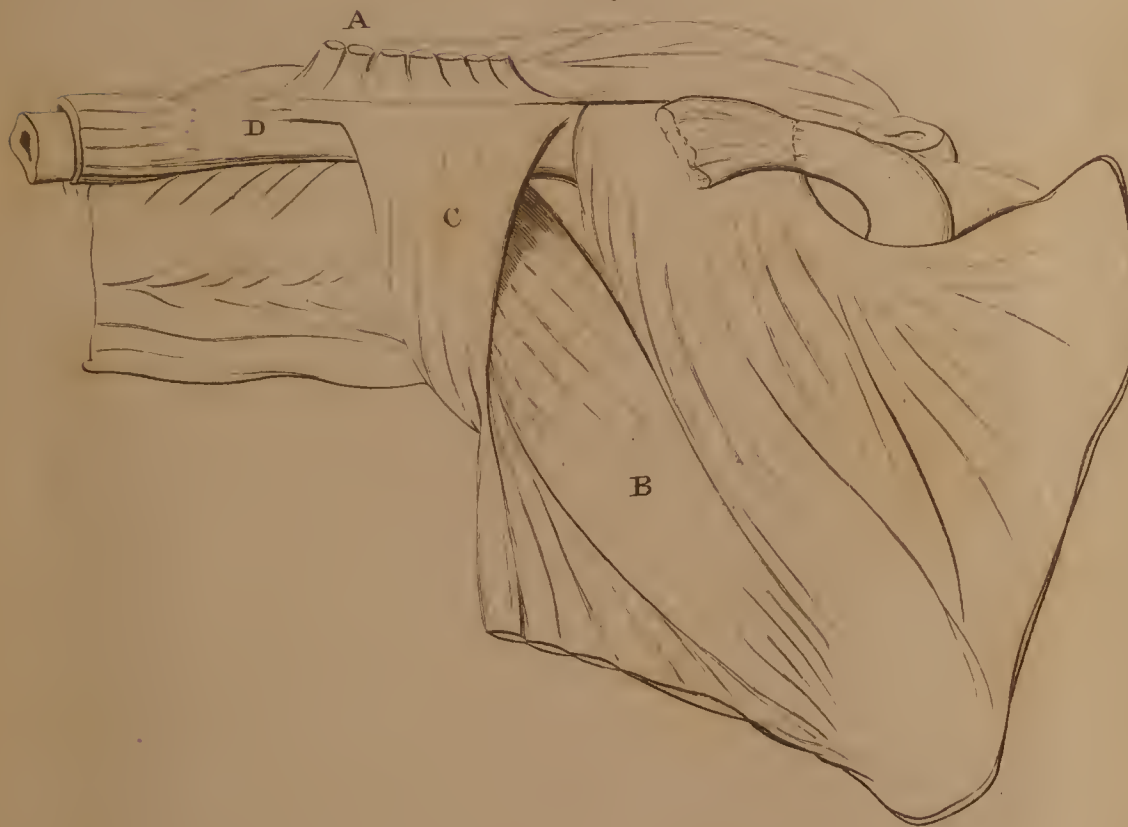


Fig. 6



Fig. 7



Fig. 8



Fig. 9

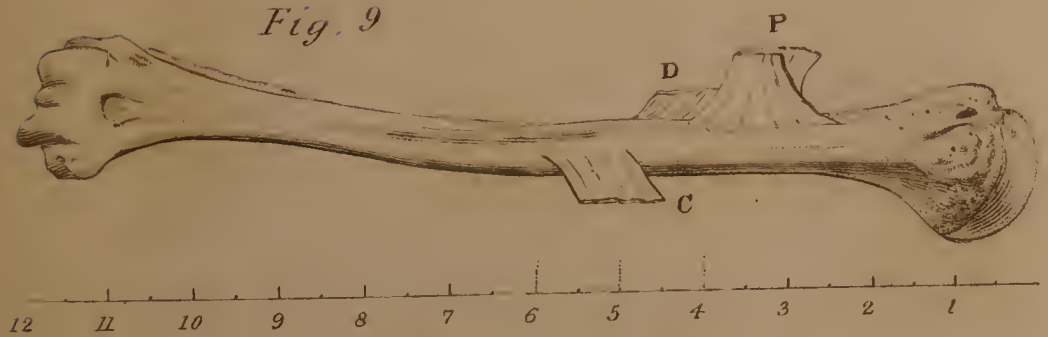


Fig. 11



Fig. 12

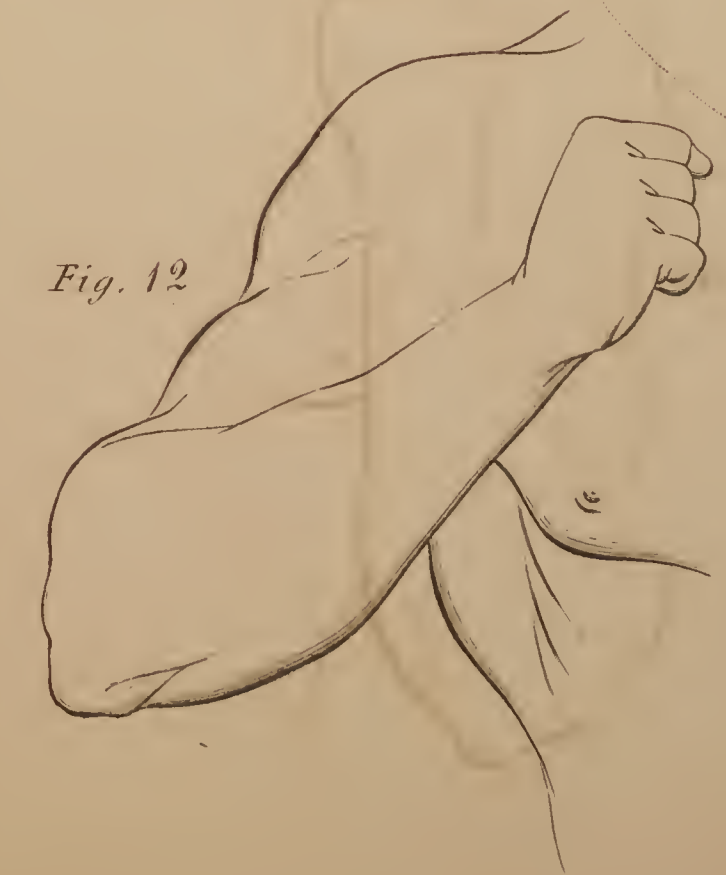
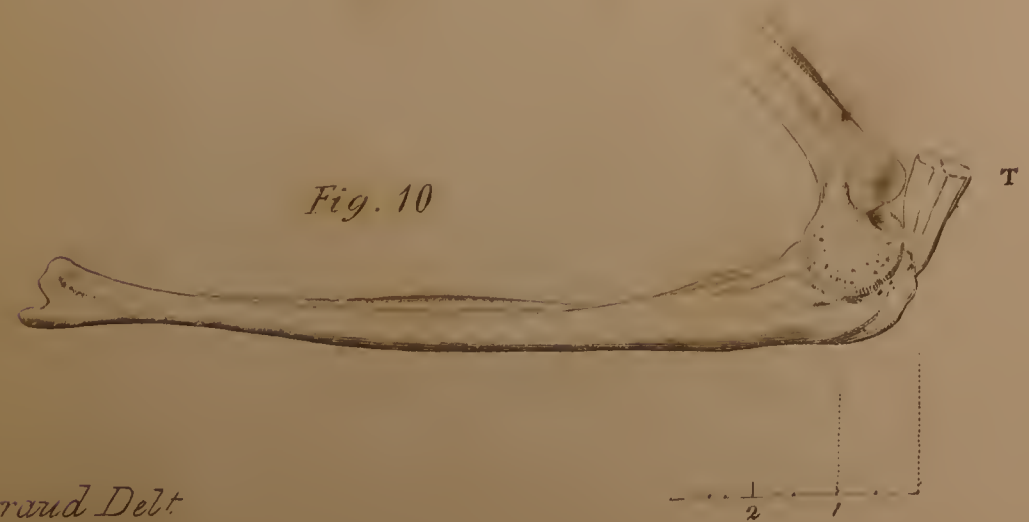
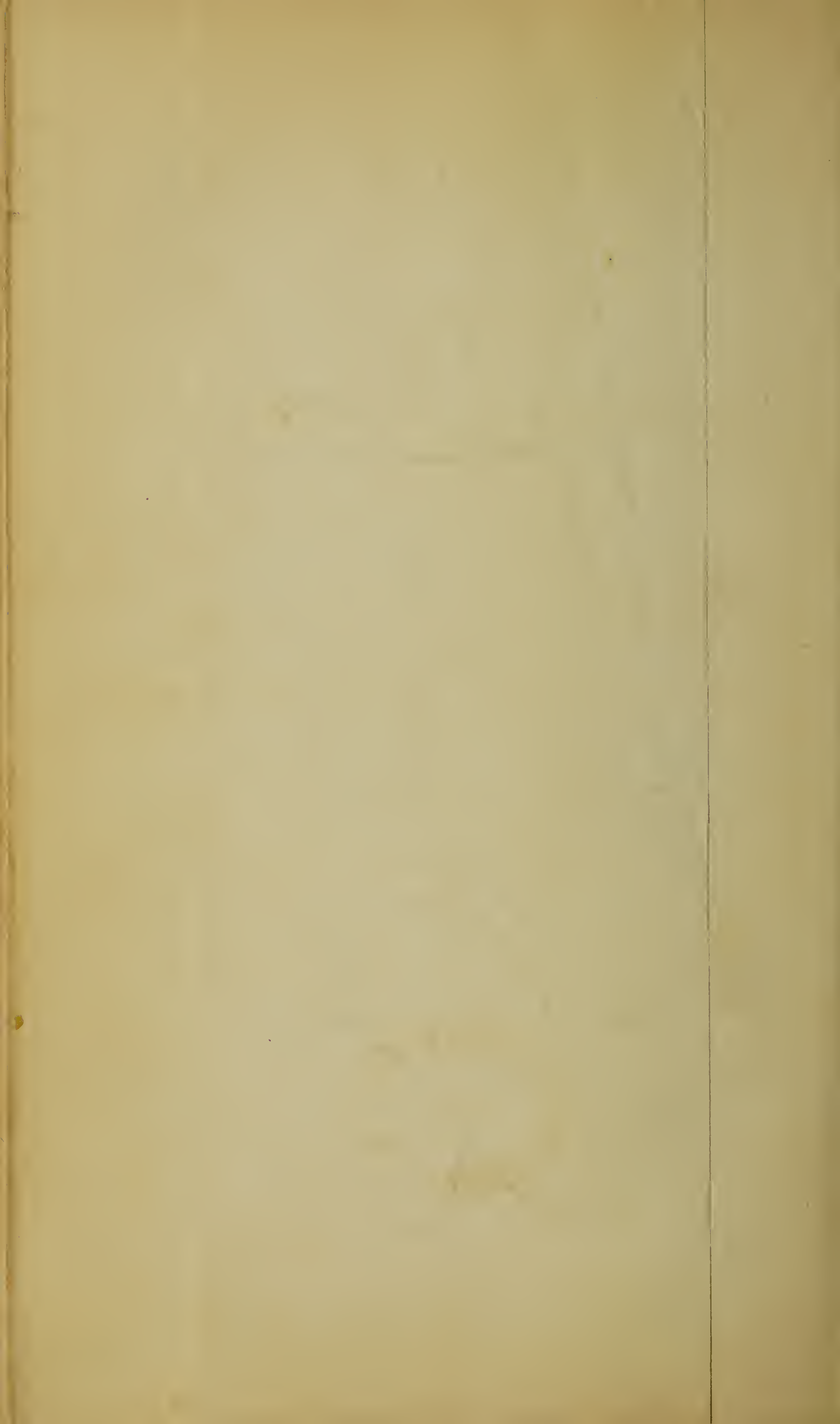


Fig. 10





*Dr B. C. Brodie Bart
with J. Blackburn's best respects.*

7

REPORT OF A CASE
IN WHICH
THE ELBOW-JOINT
WAS SUCCESSFULLY
EXCISED BY C. A. KEY, ESQ.
AND
AN ESSAY
ON THE
EXCISION OF DISEASED JOINTS.

BY
JOHN BLACKBURN, A.M.

PUBLISHED IN
THE GUY'S HOSPITAL REPORTS, No. II.



A C A S E
IN WHICH
EXCISION OF THE ELBOW-JOINT
WAS PERFORMED
BY MR. KEY.

CHARLES BROWN, aged 30, was admitted into Philip's Ward, Guy's Hospital, March 23, 1835. He is rather under the middle size; not strongly built; of sallow complexion, and dark hair; seems emaciated; and looks ten years older than he states himself to be. His family have in general been healthy. He was born in London, and has resided there all his life; is unmarried; has been a man of very temperate habits; has not been accustomed to take much exercise; but has generally had good health, with the exception of cough during the winter; and from this he has been free, as his elbow has become worse. His employment has been that of shopman, in an oil-and-colour warehouse in the city. On examining his chest by auscultation, there were found to be slight traces of chronic bronchitis. All his other functions appeared to be healthily performed.

Seven years ago, he received a severe blow on the elbow, which produced some tingling sensation at the time, but no immediate effects of consequence. In a week, however, the joint became swollen and painful, and, as he continued to use it in his business, grew rapidly worse. He sought and obtained medical advice, but with no benefit. In a short time, matter formed in the neighbourhood of the joint, which was discharged by incision; but the wound remained open, and has continued to pour forth a small quantity of pus ever since. From that time, the motion of the joint was greatly impaired; though he continued at his work, and could lift heavy weights when they were below him. He was unable to raise any thing above his

head. After the first discharge of matter, the swelling subsided, and the joint remained of its natural size ; until about six months since, when it began to swell again, and the pain and weakness were so much increased, especially after any exertion, that he was compelled to abandon his occupation.

When he entered the hospital, the circumference of the diseased elbow exceeded that of the sound one by about two inches ; the muscles, both above and below the disease, were much wasted ; the skin had the well-known tense and livid appearance ; he had entirely lost voluntary motion of the joint ; the fore-arm was flexed at nearly a right angle ; and there were three fistulous openings, by which the probe could be passed down to the humerus and ulna, both of which were soft and denuded. Very slight flexion and extension might still be given to the joint ; but any attempt to increase them was attended with great pain, so that he felt all the inconvenience of bony ankylosis, without its strength or security. He could not write, without support from his other arm ; and the motions of the hand were impaired. A brownish watery fluid was constantly discharged from the sinuses ; and he complained of occasional pain in the wrist, which seemed analogous to the sympathetic pain of the knee commonly experienced in disease of the hip-joint.

During the eight weeks following his admission, several collections of matter formed, attended with great pain and constitutional irritation. Once or twice he appeared to be threatened with hectic fever ; but towards the end of May his health had somewhat improved. Every ordinary method of cure had been tried before his admission to the hospital ; and the only resource appeared to be amputation or excision. As the man was determined not to submit to the former, and as there were no traces of organic visceral disease, excepting the slight bronchitis already noticed, Mr. Key decided on performing the latter operation. In this decision he was strengthened by the concurrence of Sir Astley Cooper, who was called in to a consultation on the case.

The operation was performed on the 9th of June. The patient had a rather rapid pulse, and had slept little ; but his tongue was clean ; his spirits good ; his bowels had been freely open ; and he seemed, on the whole, in better health than usual. He was made to lie on a table, with his face downwards,

and his arm hanging over the side, and resting on a pillow. One assistant grasped the arm above, keeping his thumb ready to compress the brachial artery, while another made steady the limb below. Mr. Key commenced the operation, by running his knife transversely through the skin and triceps tendon, immediately above the olecranon; taking care to keep the back of the knife towards the ulnar nerve. A longitudinal incision, of from three to four inches in extent, was made on each side of the transverse, so as to form the letter H. The square flaps thus obtained were then dissected back, as close to the bone as possible. In this part of the operation there was great difficulty; for the cellular membrane was so densely infiltrated with lymph, as, in fact, to have developed a new structure, upwards of an inch in thickness, and of such toughness and tenacity that great force was required to cut it away from the bone. The olecranon was first laid bare, and sawn off. A small knife, rounded at the point, was now used, to separate the mass of substance lying behind the internal condyle, and in the space between the olecranon and coronoid process of the ulna; and this mass, containing the ulnar nerve, was afterwards carefully kept out of the way by retractors. A similar dissection was made around the ulna, on its external side; and the arm being bent as much as possible to an acute angle, rather more than half an inch of the head of the bone was removed. The radius was next examined; and being but slightly affected, little more than its articulating cavity was taken away. The superior flap was then turned back more completely, and nearly an inch of the humerus removed by the saw and pliers; the parts beneath being protected by the finger, and those adjacent held back by retractors. A small cavity, partially filled up by granulations, was observed on the divided surface of the humerus; and from another point there oozed a quantity of healthy-looking matter. Some small fragments of bone, adhering to the surrounding tissues, were then removed; the flaps brought together by stitches of the interrupted suture; and strips of plaster, between which were left openings for the escape of fluid, carried round the elbow.

The patient suffered much pain during the operation, which lasted about half an hour. He lost very little blood, and no vessel required a ligature. On being conveyed to bed, his arm was disposed on a pillow, in the posture he felt to be

most comfortable. In the evening, we found him very tranquil, with a quiet pulse and clean tongue. The pain in the elbow was not great; but he suffered severely from the sympathetic pain in the wrist, extending to the thumb. The power over the ring and little fingers, and the sensation in them, were perfect.

On examining the pieces of bone removed, they were found to be in a state of ulceration; to be everywhere divested of their cartilages; and to possess few traces of their natural form.

June 10. Pulse 92; tongue clean; appearance good. Has had little or no sleep. The pain in his wrist, though less, still exists, and is now spreading up to the elbow. The pain from the wounds is slight, and there is but little inflammation around them. A poultice was applied over the strapping; and a grain of calomel, with one of opium, prescribed to be taken at bed-time.

11. Has slept well; is free from fever; and suffers little pain. On removing the strapping, the size of the elbow seemed decreased; and a good deal of adhesion was found to exist between the edges of the flaps.

12. Has a quiet pulse; a clean tongue; and a cool skin. Complains of pain extending from the elbow to the wrist, though less acute than formerly. There is a slight tendency to the spread of inflammation down the arm. As his bowels had not been open since the operation, the *Mist. Magn. c̄ Magn. Sulph.* was prescribed.

13. Looks remarkably well this morning. His bowels have been freely opened, and the tendency to the spread of inflammation seems gone. He complains more of weakness, and of disturbed sleep, than of pain.

15. Going on favourably. He has a slight degree of fever, but not more than might be expected to attend the process of suppuration, which is now setting in. He has a general soreness, and some throbbing around the elbow.

18. To-day, the arm was gently moved, and without occasioning much pain. The transverse incision has united; but the lateral ones gape, and discharge a good deal. He has some tenderness in the bend of the arm, and down the fore-arm. His sleep and appetite are better; and he is allowed a mutton-chop. The sutures were removed on the 16th.

23. The suppuration is copious, and he seems enfeebled. Pulse 90, and soft. There is no undue inflammation about the wound. He is allowed a pint of porter daily.

Minute and daily reports, however valuable to the student

who takes them, prove tedious to others; and the remainder of the narrative will therefore be given more rapidly.

The incisions gradually closed, except at one or two points, where long sinuses were found to exist; and two of the old sinuses continued open. Around one of these, situated at the part on which the weight of the arm principally rested, and where of course there was constant pressure, an ulceration of the unhealthy skin took place; which slowly healed, by suitable applications. The discharge became very small in quantity; and he began to feel some strength in the arm. He got up on the 29th of June.

Early in July, an abscess formed in the bend of the arm, the pain and fever accompanying which reduced him considerably. On the 9th, to his great relief, the matter was evacuated by an opening made over the situation formerly occupied by the internal condyle; and on the 15th, the joint was cased in two or three layers of soap-cerate strapping. The support and comfort afforded by the strapping were very great; and from this time his improvement was marked. It was now judged proper to commence passive motion; and as it seemed probable that the new joint, if left to itself, might acquire more than its natural mobility, the arm was placed on a splint, so constructed, by means of a central hinge, as to allow of extension to a straight line, and of any degree of flexion, but preventing lateral motion and extension beyond the straight line. On this splint, his arm was gently moved backwards and forwards every day, and its mobility gradually increased. The cases of strapping were renewed every five or six days; and on each successive change, the size of the joint was perceptibly diminished. Two or three sinuses remained open; and once or twice, on examining these, the probe struck on denuded bone. The discharge from them was however exceedingly small; and the tenderness was so slight, as scarcely to deserve notice. The improvement in his health and appearance was still more remarkable. He passed a great portion of the day in walking about in the open air; his appetite, sleep and spirits were excellent; he felt himself to be much stronger, and the appearance of premature old age had left him. In the middle of August, he could raise the arm by its own muscles; and could write, without any support from the other arm; neither of which feats he had been able to accomplish for six months previous to the performance of the operation. The motion acquired was sufficient to do away with all fear of his having too little. The only unfavourable appearances were, that the sinuses remained open; and that, as the size of the joint diminished, there was a good deal of ulceration burrowing between the skin and the morbid tissue which was being absorbed.

During September and October, a number of small abscesses formed around the joint, occasioning much inconvenience ; and about the middle of the latter month, he was attacked by erysipelas, which was then prevalent in the hospital. On his recovery from this attack, he began again to improve ; and during November his progress was very rapid.

The report of December 9th is : “ He can now raise the arm to the head without difficulty ; can bring his fingers to his mouth ; and possesses considerable voluntary motion, which is constantly increasing. He writes with a firm and steady hand. The new articulation is of course rounded, and wants the angular prominences of the natural joint ; but the swelling is very inconsiderable, and the volume of the muscles of the arm is much greater than before the operation. Two or three small sinuses continue open, apparently, in consequence of slight subcutaneous ulceration. The discharge from them is almost imperceptible. He is free from pain and uneasiness, and his health is good.”

Nothing could be more satisfactory than the subsequent progress of the case. There existed little reason for his remaining in the hospital, except as it afforded the opportunity of witnessing the steady advance of the limb in strength and usefulness. When he left the hospital, early in February 1836, the extent and freedom of motion were very surprising. Some deposit of ossific matter had taken place on the sawn extremity of the humerus, as the joint had returned in some measure to its original shape ; and bony projections could be distinctly felt, occupying the places of the condyles. He wrote as well and as easily as he had ever done ; and used his arm, on all ordinary occasions, without inconvenience. The triceps, which had chiefly suffered in the operation, appeared to have reinserted itself into the ulna, as its volume was greatly augmented, and the extension was powerful. One sore continued open ; but it was evidently superficial ; and the integuments generally around the joint were tender and delicate, as might be anticipated from their being so long covered with poultices and dressings. His health was excellent ; he felt stronger than he had done for some years past ; and designed to return shortly to his employment.

AN ESSAY
ON THE
EXCISION OF DISEASED JOINTS :

READ BEFORE
THE PUPILS' PHYSICAL SOCIETY, GUY'S HOSPITAL.

THE ulcerative diseases of joints have always been ranked among the most intractable maladies which are submitted to surgical care. It is rational to hope, that methods of treatment may one day be discovered, which shall restore the organ to its healthy condition ; but the ablest surgeons are ready to confess, that, hitherto, every plan of treatment has proved unsatisfactory. “*Quelque soit,*” says Boyer*, “*la cause des tumeurs blanches, lorsqu’elles sont anciennes, accompagnées de douleurs vives, que les os et les cartilages sont gonflés, ramollis, cariés, l’articulation remplie d’une matière sanieuse ; qu’il s’est formé des abcès dont les ouvertures sont restées fistuleuses, et versent une quantité plus ou moins grande d’un pus séreux et fétide ; la maladie est ordinairement incurable.*” After fruitless efforts to overcome the disease, the limb is generally removed : and it is not unjust to affirm, that the diseases classed under the head of White Swelling occasion three-fourths of the amputations which occur. This is one of the most painful resources to which the surgeon can be driven. In other great operations, such as Lithotomy, the ligature of an artery, or the release of a strangulated Hernia, a formidable disease is cured ; and the patient returns to society, complete in all his organs : but the subject of amputation, curtailed of his fair proportions, and exposed to numberless inconveniences, which those only who have lost a limb can appreciate, remains, through life, an opprobrium to our art.

As a smaller evil than amputation, it has been proposed to excise the articulating extremities of the bones forming the affected joint. This bold operation is said to have been recommended by Hippocrates and Paulus Æginetus ; but the passages in both these writers, on which the supposition rests, are obscure ; and, in the former, seem to allude to compound dislocations and other injuries of joints,

* *Traité des Maladies Chirurg.*

rather than to their chronic diseases. The record of the first actual performance of the operation is to be found in a note, appended, by Mr. Park of Liverpool, to a Collection of Pamphlets on this subject, published by Dr. Jeffray of Glasgow, in 1805. It is there stated, that, in 1762, Mr. Filkin, of Northwich in Cheshire, removed the patella, along with the articulating extremities of the femur and tibia, from a carious knee-joint. A similar operation was performed on the shoulder, in 1767, by Vigaroux*, a surgeon of Montpellier. Neither of these cases was published until after the commencement of the present century; and they cannot, therefore, have influenced the practice of Mr. White† of Manchester, who, in 1769, removed from a diseased shoulder-joint what he supposed to be the head of the humerus; and with such success, that the patient could afterwards carry heavy weights, and regained every motion of the arm‡. The publication of Mr. White's case drew the attention of surgeons to this subject; and his practice was imitated by Mr. Bent of Newcastle, in 1771§; and, a few years afterwards, by Mr. Orred|| of Chester. It will be observed, however, that, in all these cases, with the exception of Mr. Filkin's, which was not heard of before 1805, only one articulating surface was removed, and no attempt was made to extend the treatment to other articulations. The honour of originating the operation, as it is now performed—of basing it on sound surgical principles, and of shewing its applicability to several of the large articulations—is unquestionably due to Mr. Henry Park of Liverpool¶. This gentleman, after long reflection and many

* Œuvres de Chirurgie Pratique, par Vigaroux jun. *Montpellier*, 1812.

† White's Cases and Observations and Surgery in the *Phil. Trans.* Vol. 59.

‡ Mr. White's Case has always been appealed to, as one of genuine excision of an articulating extremity. I confess that I greatly doubt whether it was so. The drawing which he has given of the bone removed, represents only a portion of the shaft *beneath the epiphysis*; and if we add to this the facts, that his patient had not been ill more than a fortnight; that no dissection was required to expose something which White thought was the head of the bone, and which protruded spontaneously on an incision being made through the deltoid; that a large piece of the shaft subsequently exfoliated; that the bone was regenerated; and, that the motions of the joint were as perfect and strong as ever; we shall have some reason for believing that an acute necrosis had separated the shaft from the epiphysis, and that the shoulder-joint was not excised.

§ *Phil. Trans.* Vol. 64.

|| *Ibid.* Vol. 69.

¶ I am the more anxious to make this statement, because Mr. Syme and M. Velpeau have thought proper to treat very slightly Mr. Park's merits. The pamphlet in which this gentleman proposes the operation evinces a candid, reflecting, and enterprising mind. The circumstance of his not having had the opportunity of carrying his ideas extensively into practice

experiments, was led to believe the operation admissible, and, in 1781, performed it on the knee-joint with entire success. In 1782, he brought the subject before the profession, in an able letter addressed to Mr. Pott of St. Bartholomew's, which canvassed the merits of this bold experiment, and detailed its results; and, in 1789, he communicated a second case to the *London Medical Journal*. It happened, by a curious coincidence, that in 1783, the year following the publication of Mr. Park's pamphlet, the question was brought before the Royal Academy of Surgery in France; and in 1786, a French surgeon, named Moreau, excised the head of the humerus and glenoid cavity*. In 1792, Moreau operated on the elbow; and, subsequently, he and his son several times excised the articulating surfaces of the knee, ankle, shoulder, elbow and wrist joints. Their example was followed by Sonmeillier†, and, it is said, by Baron Percy‡: but, in spite of the successful results of these cases, the operation failed to excite attention. "I am mortified," Mr. Park writes in 1805, "to see that it (his pamphlet published in 1782) has to this day produced very little of the effect it was intended to produce I have not yet heard that it has hitherto proved the means of saving a single limb, in the whole of the British dominions; and, since its publication, this country has passed through a long and bloody war ||." In 1809, Mülder cut out the knee-joint at Gröningen; and in 1810, Wachter, a German surgeon, published this case, with a long essay on the subject §. In 1813, excision was made the topic of a thesis by M. Roux; and in 1819, this gentleman revived the operation, by excising the elbow-joint, at Paris ¶. In 1823, it was performed by Mr. Crampton of Dublin** ; and in 1825, by Mr. Syme of Edinburgh ††. The operation has since been repeated by these

practice will weigh little with those who can appreciate the sound argument by which the proposal is supported. The foresight which predicts the results of an untried measure evinces higher talent than the industry which collects together the evidence of experience. Mr. Park's honour as a man, and skill as a surgeon, are still proverbial in the scene of his former labours.

* *Vide Cases of Excision of Carious Joints by Park and Moreau, edited by Dr. Jeffray. Glasgow, 1805.*

† *Vide Moreau's Pamphlet, in Jeffray's Cases, &c.*

‡ I have examined the Baron's *Pyrotechnie Chirurgicale Pratique*, and his *Manuel du Chirurgien d'Armée*, but have not met with any notice of these cases.

|| *Vide Dr. Jeffray's Cases &c.*

§ *Dissertatio de Articulis Extirpandis, auctore G. Wachter. Gröningen, 1810.*

¶ *Revue Médicale, 1830.*

** *Dublin Hospital Reports, Vol. IV.*

†† *Syme on the Excision of Diseased Joints.*

three surgeons; by Mr. Spence of Otley in Yorkshire; by Dr. Simpson of Edinburgh; by one of the surgeons to the Glasgow Infirmary*; and, in the course of the last summer, by Mr. Key of this hospital. The excision may therefore be said to have acquired, in our day, a larger number of supporters than at any former period; though it is not yet sufficiently established to render an inquiry into its merits unnecessary.

The operation, as we have already stated, consists in the excision of the articulating extremities of bone which enter into the composition of a diseased joint. It has a twofold object: the first is, to remove a formidable disease; and this might be effected by amputation: the second is, to preserve a useful limb; and this, amputation could not effect.

The fact in morbid anatomy on which the proposal mainly rests, is, that, in the large majority of the ulcerative diseases of joints, the bone is either primarily affected, or becomes so secondarily. This fact is familiar to those who have been in the habit of dissecting diseased joints, and generally recognised by surgeons. In many of the chronic affections classed under the head of White Swelling, the bone itself is the tissue primarily diseased; and of the remaining cases, in which ulceration commences in other tissues, the bone, in a large proportion, takes on a similar action. Becoming softened, and highly vascular, as the cartilage is removed, it gradually advances to the state of confirmed caries, in which we commonly find it after death or amputation. Occasionally it happens, that inflammation commences and terminates in the synovial membrane†; and more frequently, after the cartilaginous surfaces have been entirely removed, the disease ceases, ligamentous tissue is thrown out between the bones, and a cure is obtained by the establishment of soft ankylosis. These instances are, however, comparatively rare. Sir B. Brodie, in his well-known work, gives thirteen dissections of joints in which ulceration had commenced in the cartilage. In ten of these, the bone was found to be more or less affected, according to the duration of the disease; and in two of the remaining three, the disease was in so early a stage, that only portions of the cartilage were removed. Long after every other tissue has become destroyed, or blended with the surrounding parts, the bones, affected by an obstinate caries, continue the disease.

If there were any satisfactory method of treating caries situated in

* Vide Dr. M'Farlane's Clinical Reports of the Surgical Practice in the Glasgow Royal Infirmary, 1832.

† Vide Brodie on Diseases of the Joints.

the articulations, the use of the knife and saw would, of course, be inadmissible. The general consent of surgeons establishes that there is not. Like other tissues not highly organized, bone slowly takes on a diseased action; but when that action is once established, it is most difficult to eradicate. The application of caustic, or of the actual cautery, which is the treatment of caries on which most reliance may be placed, is manifestly impracticable when the disease is situated in the articulations; and all other means are confessed to be merely palliative. “Dans les cas,” says Boyer, “où la maladie affecte une articulation, et où, comme nous verrons de la voir, les moyens les plus puissans ne peuvent être mis en usage, il n’y a point d’indication curative à remplir; il faut se borner aux soins de propreté, au repos et à un régime fortifiant et nutritif.” Further on, he adds: “Les terminaisons spontanées et heureuses de la carie sont extrêmement rares: elles n’ont presque jamais lieu chez les sujets adultes et les vieillards.” It is unnecessary that I should multiply testimonies; for there are few who have not watched the melancholy progress of these cases. Month after month, a wasting discharge preys upon the patient’s strength, bringing on a premature old age; and, after a time, colliquative diarrhœa and hectic hurry on the fatal conclusion.

The cases to which excision is applicable may be readily inferred, from what has been now stated. It may be practised, where we have scrofulous caries of the epiphyses destroying the joint; where, after ulceration of cartilage, the bone assumes a corresponding action; and where, without any direct evidence of diseased bone, such formidable ulceration of the ligaments and cartilages is proceeding, as to baffle all our remedies, and threaten the life of the patient. There are, however, certain limitations to be observed. Serious organic disease of the viscera would, of course, contra-indicate excision equally with any other severe operation. Amputation ought to be preferred in those very old cases, occasionally to be met with, in which the muscles, for years inactive, have become converted into a fatty substance, and can never recover their natural structure and functions. Here the limb, if preserved, would be worse than useless. Again, if the bones are extensively carious beyond the immediate neighbourhood of the articulation, excision would be preposterous, as we could have no hopes of eradicating the evil. It would be almost equally inadmissible where life is in imminent danger from enormous abscesses surrounding the joint, or extending to some distance beyond it, and destroying the patient by the copiousness of their secretion. I recently dissected a limb, in which one abscess extended half way up the thigh, while another occupied the whole calf of the

leg down to the commencement of the lower third of the tibia. In such a case, the abscesses, after excision, would continue to discharge; and though we might reasonably hope, having removed the source of irritation, that they would ultimately close if the patient had strength to bear him through the struggle, there would be every reason to fear that a constitution so exhausted, as the one we have supposed, must rapidly sink. Lastly, it may be laid down as a general rule, that we ought not to excise, where there is any curative indication to fulfil.

There is one other affection of joints, in which an operation similar to excision might be tried. An important articulation, as, for instance, that of the elbow, may, from different causes, become fixed by bony ankylosis. To many persons, this state of things might be productive of no inconvenience sufficiently serious to warrant an operation; but there are others, on whom its effect would be, to deprive them of their livelihood, and to ruin every prospect in life. Under such circumstances, a skilful surgeon, making use of the chain-saw, might separate the unnatural union, without cutting across any of the muscles; and if passive motion were speedily commenced and diligently prosecuted, a false joint might be obtained, available for all the ordinary purposes of life.

Let us now examine the evidence adduced to shew that the objects of the operation may be obtained. Will the patient be freed from a formidable disease? We are warranted in concluding that he will, because we remove the whole, or nearly the whole, of the diseased structures, and leave two healthy surfaces of bone, destitute of ligament or cartilage. This belief is further confirmed, by observing the process of nature in the spontaneous cure of caries. After a long continuance of discharge, attended with great swelling and numerous sinuses, small fragments of bone are observed on the dressing; or, occasionally, larger pieces present themselves, and require removal by the forceps. After this process has gone on for some time, the whole of the disease appears to be cast off; the discharge and swelling diminish; the longwinding sinuses close, or give vent only to a few drops of serous secretion; the probe no longer strikes on soft and denuded bone; and the fortunate patient regains his health. Thus Sabatier* relates two cases, in which portions of the articulatory surfaces of the shoulder-joint came away, and the parts rapidly healed. In 1740, Mr. Thomas, a surgeon at Languedoc, removed, in small fragments, and at different times, the head of the humerus, through an opening which had been made for the discharge of matter; and

* Bulletin des Sciences, publié par la Société Philomathique.

Wachter* records a case, in which Balck, a German surgeon, extracted, in the course of two or three months, the whole articulating surface of the knee-joint; which, so to speak, sloughed off spontaneously. In both these cases, the patients speedily recovered, and subsequently possessed strong and useful limbs. Again, in a case of simple exfoliation, or of necrosis, we find, that nature gets rid of the irritating body, by casting it off from the living mass; and until this is done, no progress is made towards a cure. It is true, that, in one respect, the analogy does not hold good; for in exfoliation and necrosis the bone is dead, while caries, being a diseased action, implies vitality: but as we have no satisfactory method of remedying this disease, we may, for all practical purposes, safely consider the bone as dead, and take our measures accordingly. It is this natural process of casting off, which excision strives to imitate, where nature seems incapable of performing it; and if the accompanying swelling and sinuses do not extend beyond the immediate neighbourhood of the articulation, success may fairly be anticipated.

The records of surgery furnish analogies still more conclusive. Mr. Hey†, in a case of caries of the tibia, removed, by a circular-headed saw, a wedge of the bone two inches in length; and, as this brought into view a caries of the cancelli almost equally extensive, he applied the trephine, until he had penetrated nearly to the opposite lamina of bone. Other carious points were then cut away with a strong knife; the wound healed without exfoliation, and there was no return of disease. Mr. Hey adds: “I have treated some other cases of caries of the tibia in the same way, and with equal success.” Similar to this was the practice of Troja, Trisen, David, and Weidmann; and the application of caustic, or of the actual cautery, proceeds on the same principle—that of inducing a separation between the diseased and healthy portions. What valid objection, then, can be urged to a corresponding treatment of caries in the articulations? It may, indeed, be said, that we are not always able to ascertain the extent of the caries. We know, however, that this disease does not often attack the shafts of long bones. Its ravages are generally confined to the spongy tissue which forms their epiphyses, and, as we remove this tissue when we excise the articulating extremities, there is good ground for believing a recurrence of the disease improbable. The situation of the fistulous openings, the extent of the swelling, and an examination by the probe, will also aid in the formation of an opinion: and it may be further observed, that, in the course of the operation, the surgeon has the opportunity

* *Dissertatio de Articulis Extirpandis.*

† Hey's *Pract. Observ. in Surgery.*

of examining the state of the bones. Any small ulcerating portions may be removed by the gouge or the trephine; and, at the worst, if the mischief prove to be more extensive than he had anticipated, he can resort to amputation.

If it be said, that, as the disease frequently commences in the soft parts, and as these structures are always more or less involved, there can be no surety that excision of the joint itself will effect a cure; I answer, that the cartilage (if there be any traces of it remaining) is removed by the operation; that much of the ligamentous tissue shares the same fate; and that the synovial membrane, in nearly all the cases to which excision is applicable, has disappeared, or rather has become so altered in character, as to be no longer susceptible of the diseases of its normal state. The morbid tissues surrounding a diseased joint differ little from those surrounding a caries in any other part: and although the reparative process may naturally be expected to proceed slowly under such circumstances, there is no reason to apprehend that any serious obstacle will arise in the one case more than in the other. The lardaceous tissue, the masses of cellular membrane infiltrated with lymph, and the burrowing abscesses, are the secondary effects of adjacent lesion, and will disappear when that lesion no longer exists. Proofs of this may be found, in the cases cited by Sabatier, and in those of Thomas and Balck already noticed, where, after the surface of the joint had come away, the soft parts were speedily restored to a healthy state. When I come to speak of the cases in which excision has actually been performed, the proof will be still more satisfactory.

If these conclusions be just, it only remains for me to shew, that the operation is not more dangerous than many others which are universally practised; and there will be sufficient proof that the first object named—the removal of a formidable disease—is of probable attainment. A clean incised wound is made over a joint already open by disease and ulcerating; two smooth surfaces of healthy bone are left at the bottom of the wound; and the parts are then brought into contact, that the process of adhesion may be instituted. No large nerve or artery is divided; so that the hæmorrhage is inconsiderable, and the circulation proceeds undisturbed through its accustomed channels. Compare such a state of things with a compound fracture, where there is a laceration of soft parts incomparably more dangerous than a clean incision, and where two ragged surfaces of bone are exposed, producing irritation by their sharp spiculæ; or with amputation, in which we have a wound at least equally extensive, and the superadded evil of large nerves and vessels divided; or with compound dislocations, where a protruding portion of bone is

sawn off; and it will be seen that the danger of excision is by no means extraordinary. It is true, that the incisions are made through morbid structures; but experience teaches, that these structures, which consist generally of a lardaceous tissue, of masses of adipose matter, or of cellular membrane infiltrated with lymph, are less disposed to produce intense constitutional irritation than more highly-organized and healthy parts. In caries, not situated in the articulations, or in necrosis, the surgeon does not hesitate to make a section of similar structures; and, in amputation, the knife is frequently carried with impunity through the centre of an abscess. The greatest danger in excision is, that the patient may not have sufficient strength to carry on the process of adhesion, and that a profuse suppuration may exhaust the vital powers: but every operation, in which a large wound is inflicted, might be objected to on the same grounds; and we have more certain methods of obviating such an evil, than of controlling phlebitis or secondary hæmorrhage.

I may now proceed to inquire, whether it is probable that the second object of the operation—the preserving a useful limb—will be attained. On this point, we have the light of analogy, and of direct experiment on the lower animals, to guide our judgment. In compound dislocations, it has been the approved practice, especially since the publication of Sir Astley Cooper's great work on this branch of surgery, to saw off a protruding extremity of bone which there was difficulty in reducing: and it is worthy of notice, that not only has a serviceable limb been obtained, but the dangers of the accident have been materially diminished. "The constitutional irritation," Sir Astley remarks, "is very much lessened, both by the suppurative and " ulcerative process being diminished, and by the ease with which the " parts are restored. In the cases which I have had an opportunity " of seeing, there was not more irritation than in the simplest com- " pound fracture. *I have known no case of death when the extremi- " ties have been sawn off; although I shall have occasion to mention " some in which the cases terminated fatally when this has not been " done.*" Sir Astley records many cases in which this treatment was pursued; and in all, with one exception, the limb ultimately became extremely useful; motion, to a considerable extent, was generally acquired; and the greatest inconvenience that ensued was a limp in walking. Mr. Hey, in his "Practical Observations in Surgery," states, that a gentleman named Taylor removed the extremity of the tibia in five compound dislocations; and all his patients regained the power of walking firmly. Mr. Park* mentions, that a gentleman

* Dr. Jeffray's Cases, &c.

who underwent the same operation recovered so completely, that he could walk a whole day shooting, and dance all the evening, without inconvenience. Nor is it only in the ankle-joint that such results have been obtained. Mr. Park cites a case of compound fracture, in which the lower extremity of the humerus, and a portion of the olecranon, being broken off, were removed; and yet there was afterwards "considerable strength in the arm, and every motion very nearly perfect." In a similar case, Mr. Hey dissected out the lower extremity of the humerus; and the boy who had met with the accident was subsequently able to write, to raise his hand to his head, to lift heavy weights when they were below him, and to flex and extend the fore-arm at pleasure.

Equally fortunate results have followed a corresponding treatment of gun-shot wounds of the articulations, with injury of bone. The best authorities in military surgery lay it down as a rule, that, when the head of a bone is shattered by a ball, the fragments ought to be extracted, and the joint left to itself; unless some great vessel be wounded, or the lesion of the adjacent soft parts be inordinate. In 1814, Baron Percy informed Mr. Crampton,* that in this way he had repeatedly succeeded in saving limbs which otherwise must have been amputated. Boucher† records a case, in which the elbow was traversed by a pistol-ball, and exfoliation of the articulating surfaces ensued; yet the patient recovered, and could use the wounded arm almost as freely as the other. Parallel cases, occurring in other joints, are given in the same paper; and Balguer‡ records several instances in which the elbow was shot away without destroying the usefulness of the limb. The most decisive testimony, however, is afforded by Baron Larrey||; who states, that in ten cases in which a ball had shattered the head of the humerus, he had succeeded in saving the limb, by making a longitudinal incision through the deltoid, exposing the joint, luxating the head of the bone, and excising it. In one remarkable case, he removed the head of the humerus, the acromion process, the acromial extremity of the clavicle, the glenoid cavity, and part of the spine of the scapula. When any exfoliation took place, he noticed that some degree of motion returned; but where there was no exfoliation, bony ankylosis seemed to ensue.

These facts appear to prove, amply, that a limb may continue to be useful, even after the removal of articulating extremities from one of the joints: and we have still to add the evidence of experiments on the

* Dublin Hospital Reports, Vol. iv.

† Mém. de l'Acad. de Chirurgie. *Paris*, 1769.

‡ Vide Wachter's Dissert. de Artic. Extirp.

|| Mém. de Chirurg. Militaire, Tom. iii.

lower animals. Vermandois* excised the head of the femur in a dog. In the course of a few weeks, the animal was found to have acquired some power over the injured limb; and ultimately could make free and strong use of it, though the shortening occasioned a limp in the walk. A similar result attended parallel experiments made by Koeler and Wachter†. In the latter part of the last century, Chaussier‡ repeatedly excised the joints of different animals, and watched the progress of the cases through periods of time varying from a few weeks to several years. He frequently excised an eighth, sixth, or even a fourth of the femur: and in this articulation, the wound invariably healed without suppuration; the cicatrix was usually formed in fifteen or sixteen days; the health did not appear to be disturbed; at the end of a month the animal began to make some use of the limb; and, ultimately, such strength and mobility were acquired, that the shortening seemed to be the principal inconvenience. In other experiments made on the knee and ankle joints, the results were less happy, for reasons which will readily present themselves to those who remember the forms of these articulations in dogs, and the purposes for which they are destined.

What, then, is the condition of a limb on which excision has been successfully performed? The first, and apparently the most natural termination which might be expected, is bony ankylosis. The parts, after the operation, are nearly in the same state with a compound fracture accompanied by loss of bone; and we might therefore anticipate, that osseous matter would be gradually deposited, and would connect together the extremities of the bones. That this result could be obtained in many cases, if suitable means were used for the purpose, I am disposed to believe; but it would be both difficult to secure, and undesirable. It would be difficult to secure, because a considerable space, amounting frequently to two or three inches, intervenes between the bones: and it would be undesirable, because an ankylosed limb, though always of some service, is a clumsy and awkward appendage. A second termination, which analogy may lead us to expect, is, the formation of a new and moveable joint, endowed with ligaments, and with structures resembling cartilage and synovial membrane. This is by no means a rare occurrence, under circumstances not widely dissimilar. Instances of its following unreduced dislocations are given by Sir Astley Cooper; and in the Museum of our hospital are several specimens of articu-

* Vide Wachter's *Dissertatio*, &c. † Ibid.

‡ Bulletin des Sciences, publié par la Société Philomathique.—An Analysis of Chaussier's Article is given in the *Mém. du Société Médicale d'Emulation*, Tom. iii.

lating surfaces formed on the acromion, clavicle, and coracoid process, in consequence of enlargement of the head of the humerus. Mr. Key*, in dissecting a subject at St. Thomas's, met with a fracture of the spinous process of the third dorsal vertebra; of which he says, "There was a complete articulation formed between the broken surfaces, which had become covered with a thin layer of cartilage. The synovial membrane and capsular ligament resembled those of other joints, except that the former was more vascular. The fluid within the joint had the lubricating feel characterizing synovia." Baron Larrey† mentions, that during the campaign in Syria, nearly all wounds of the upper extremity, complicated with fracture, were followed by the formation of false joints, however carefully treated‡:— "Les deux fragmens de l'os rompu restaient mobiles parceque le frottement continuel reduisait leurs asperités et leurs angles saillans. Les extrémités de ces fragmens s'arrondissaient et se recouvraient d'une substance cartilagineuse qui en facilitait les mouvemens." In the majority of the experiments tried on the hip-joints of dogs and other animals, by Chaussier, Koeler, Wachter, and others, it was found, on dissection, that the muscles had, by their retraction, drawn the parts together; the extremity of the femur rested on the ischium; the amputated extremity, and the corresponding portion of the ischium, were encrusted with a cartilaginous substance; occasionally there was an articular fossa, more or less deep; the cellular tissue around the new articulation formed a membranous capsule, in which was contained a serous fluid; and the old cotyloid cavity was being filled up. This, then, we may fairly consider as a possible termination of excision; but it would be incorrect to affirm, that it is a probable one. I know of no instance in which an articulation of this kind has been formed, when all the surrounding tissues have been diseased; and in an ulcerating joint we should look in vain for that free cellular membrane which becomes condensed to form a new synovial capsule. It seems, also, essential to the production of these false articulations, that considerable attrition should take place between the bones. The wound, and the distance intervening between the bones after excision, render it impossible to institute this process artificially; while the atrophied state of some of the muscles, and the division which has been made of others, prevent its being carried on

* Vide Sir A. Cooper on Dislocations and Fractures.

† Mém. de Chirurg. Militaire, Tom. ii.

‡ Larrey attributes these disastrous results to the bad climate of Syria—to the insufficient supply of nutritive food—and, with greater probability, to the motion kept up between the fractured portions, during the frequent changes of encampment consequent on an active campaign.

in the ordinary way. The third, and by far the most probable result of excision, is, the production of a mass of ligamentous tissue which shall fill up the space between the bones, and allow of motion by its flexibility. Examples of this mode of union are seen after transverse fractures of the patella or of the olecranon, and in those cases of ulceration of cartilage which terminate in soft ankylosis. It is by this structure that the cavity between the bones is filled up, after the excision of a portion of the inferior maxilla in epulis, and that the separated fragments of bone are usually connected in an old ununited fracture. Sir Astley Cooper relates, that having dislocated the ancle of a dog, he sawed off the end of the tibia; and then, returning the parts, allowed the wound to heal. Some time after, on dissecting the limb, he found that “the ligament of the joint was still “defective at the part at which it had been cut. From the sawn surface of the tibia there grew a ligamento-cartilaginous substance, which “proceeded to the surface of the cartilage of the astragalus, to which it “adhered. The cartilage of the astragalus appeared to be absorbed “only in one small part: there was no cavity between the end of the “tibia and the cartilaginous surface of the astragalus: a free motion “existed between the tibia and astragalus, which was promoted by the “length and flexibility of the ligamentous substance above described, “so as to give the advantage of a joint where no synovial articulation “or cavity was to be found.”—Chaussier and Wachter found the bones united by a similar tissue, in all their experiments on the knee and ancle joints; where, it will be observed, the constant attrition between the bony surfaces could not be maintained, which almost necessarily follows an excision of the head of the femur. This ligament, then, will form the new joint, if we may give that name to such an imperfect imitation. It takes the place of the cartilage and synovial membrane; and answers, though in an inferior degree, the purposes of both. If the limb be allowed to remain motionless for months after the operation, we shall have a stiff joint; as this structure, and the inactive muscles, will become rigid: but if passive motion be commenced at an early period, the uniting ligament will be gradually rendered pliable, and, in the end, will be so yielding as to obey readily the muscular power.

The bones being thus united, and something resembling an articulation formed, the state of the forces which are to act on this articulation will next require our attention. A degree of shortening takes place, probably equal to the full natural retraction of the muscles: and how can they act, under such disadvantages? Daily experience teaches us, that this is an evil which time will remedy. The muscles have a singular facility of becoming adapted to circumstances; and,

in process of time, will accommodate themselves to almost any change. Thus, in unreduced dislocations, or in badly-united fractures, where shortening of one or two inches has taken place, or in transverse fractures of the patella where the uniting ligament is of great length, we find the muscles, in the course of a few months, regaining power, and ultimately capable of exerting a degree of force almost equal to that which they originally possessed. But in excision, others of the muscles suffer a more serious injury than this; being dissected away from their attachments, and left loose in the wound. These, however, speedily form for themselves new insertions; just as, in a stump, the divided muscles become attached around the end of the bone and to the cicatrix; or as the flexors of the ankle-joint, after amputation through the calco-cuboidal and astragalo-navicular articulations, connect themselves to the remaining portion of the tarsus, and in some measure counteract the extension of the soleus and gastrocnemius. Some of the divided muscles will probably insert themselves into the bone to which they were originally attached: for, on the one hand, their state of atrophy will not admit of much retraction; and, on the other, the undivided muscles will have a tendency to draw the inferior portion of the limb upwards. For example: after excision of the elbow-joint, the biceps, supinators, and other uninjured muscles will draw the fore-arm nearer to the humerus, and the brachialis internus will probably connect itself again to the ulna. The muscles which do not become attached to the bone will be inserted into the intervening ligamentous tissue, and will thus gain an imperfect action on the joint. Of course, a limb so constituted will labour under great disadvantages. The soft parts surrounding the joint will always be more or less stiffened; and the rigidity of the connecting ligament will form a striking contrast to the easy gliding on one another of cartilaginous surfaces lubricated by synovia. A still greater inconvenience will arise, from the want of a firm resisting fulcrum, on which the levers may be brought into play. If, for instance, the biceps and brachialis internus, being attached respectively to the ulna and radius, contract when the fore-arm is extended, they will, at first, merely draw the ulna and radius upwards towards the humerus; because the ligament, which in this case forms the fulcrum, yields, instead of resisting. If the contraction continue, this ligament will become pressed or, as it were, condensed into a solid mass between the extremities of the bones, and the fore-arm will then begin to be flexed; but it is manifest, that much of the muscular power must have been already expended on the preliminary effort necessary to secure a firm fulcrum. Still, in spite of all these obstacles, considerable strength and mobility may be undoubtedly acquired by exer-

cise, though not such as to approximate, except in a remote degree, to the free and easy working of the natural joint.

I have now examined, with such minuteness as my limits would permit, the arguments that might be advanced in favour of excision, from admitted principles in surgery, and from analogical facts, independently of the results of experience. It remains to be seen, whether these results will establish or destroy this theoretical reasoning.

The operation is of modern date, and has not been generally practised; so that an attempt to draw up its statistics is not a hopeless task. I have consulted every work within my reach, that seemed to bear upon the subject: and, as the kindness of Mr. Key has opened to me numerous sources of information in the valuable library of the Royal Medico-Chirurgical Society, I have some reasons for believing myself to be in possession of nearly all the recorded cases. That there are some cases not on record, I am well aware: for Moreau*, after detailing one or two operations, says that he has successfully performed others of the same kind: and Mr. Liston† states, that he has several times cut out the shoulder-joints, and has assisted in doing it frequently: but these, being mentioned in so slight and unsatisfactory a manner, cannot be rendered available. It may be noticed, that the common fallacy which arises from the willingness to record successful, and to conceal unsuccessful, experiments, applies with less than ordinary force to the details I am about to give; as nearly all of them are derived from the writings of gentlemen who have faithfully recorded the particulars of every case in which they have performed the operation.

Excision has been most frequently tried on the upper extremity; and to these, the smaller size of the articulations, combined with other circumstances, will always render it most applicable. Art may provide a clumsy substitute for the inferior extremities; but no ingenuity has hitherto succeeded in supplying the deficiency of that wondrous organ, the human hand. It is also evident, from the purposes to which the inferior limbs are destined, that, to be useful at all, each must possess a degree of strength corresponding to that of the opposite side. The two lower limbs constitute a single organ: they must unite, to perform the functions for which they are designed; and one limb is of little use, without the other, or a substitute of equivalent strength. The upper extremities, on the contrary, are two perfectly distinct and independent organs, capable of being combined to effect a given purpose, but equally capable of acting sepa-

* Dr. Jeffray's Cases, &c

† Liston's Elements of Surgery.

rately. Hence, an inequality of length, power, and mobility in the upper extremities produces little inconvenience, compared with that arising from a similar state of things in the lower. The injured arm will be extensively useful as an assistant to the other, and will be adequate to the performance of many little offices; while the uninjured arm may be reserved for those occasions which require great strength and freedom of motion.

The shoulder-joint first claims attention; and it would be needless to point out the extraordinary advantages which excision here may secure. To sacrifice a whole limb, because of disease in a small part of its extent, is a measure so horrible, that it can only be justified by the certain prospect of death, if amputation be not performed. Excluding Mr. White's case, for reasons already assigned, there are eight histories of the excision of this articulation. The following are brief analyses of these cases.

CASE 1.—The earliest case is that of M. Vigaroux*; who, in a boy already so near death that amputation could not be ventured upon, undertook, as a desperate remedy, to excise the head of the humerus. The boy survived only a few days.

CASE 2.—In 1771, Mr. Bent† of Newcastle removed, from a girl, the head of a carious humerus. His patient recovered; and, subsequently, possessed perfect use of the fore-arm; could raise the elbow five or six inches from her side; put her arm behind her; lace her stays; and execute any task which did not require much elevation of the elbow.—Dr. Key saw this young woman several times after the operation, and confirms the statement as to the free and useful motion enjoyed by the limb.

CASE 3.—A third case was published by Mr. Orred‡ of Chester. The patient appeared to be rapidly sinking when the operation was performed, and great weakness occasioned the cure to be long. She did, however, recover, and had motion and voluntary power of the shoulder.

CASE 4.—Mr. Moreau§ next performed the operation. He removed the head of the humerus, the glenoid cavity, and part of the acromion, all of which were carious. The patient recovered completely, and could perform all the motions of the arm freely; except that of elevation, which was confined. The head of the humerus rested on the ribs; and there was always a hollowness of the shoulder.

CASE 5.—In 1815, Mr. Morell|| of Chelsea, and of the Westminster

* Œuvres de Chirurg. par Vigaroux jun. *Montpellier*, 1812.

† Phil. Trans. Vol. lxiv.

‡ Phil. Trans. Vol. lxix.

§ Jeffray's Cases &c.

|| Méd. Chir. Transactions, Vol. vii.

Hospital, excised the head of the humerus, diseased from a gunshot wound which had been received some months previously. The man was rapidly sinking, and amputation or excision was the only resource. No irritative fever of any consequence followed: the wound healed in two months, and the motion of the shoulder was regained.

CASE 6.—The three remaining cases are given by Mr. Syme*. His first patient, an adult female, operated on in 1826, had been suffering for six years; and for two or three years previous to the operation the joint had been immoveable. All the articulating surfaces were removed. Little constitutional irritation followed; the wounds rapidly healed; and in two or three months her arm began to be useful to her, though one of the old sinuses did not close for two years. Four years and a half afterwards, Mr. Syme saw her, stout and active; managing all her domestic concerns; able to sew, to knit, to wash, to carry a bucket of water, or any ordinary load, with the arm operated on, and possessing great voluntary power of motion, except in abduction. Six years afterwards, Mr. Syme again saw her; and she was using both arms so freely, that it was difficult to perceive a difference between them.

CASE 7.—In the same year, Mr. Syme* operated on an adult male, with a broken-down constitution, and already suffering from cough and hectic. The result was unfortunate: for although the man appeared to recover rapidly, and the wound soon healed, with the exception of one or two small sinuses, he died of phthisis at the end of six months.

CASE 8.—Mr. Syme's third case† was even more disastrous. The subject of the operation was worn and emaciated, and already exhibited symptoms of phthisis. Though no immediate irritation followed, he continued to sink; and, on examination after death, large vomicæ were found in his lungs.

These eight cases are all of which I could meet with any history. It appears that five of them have been attended with complete and lasting success; two have been followed by speedy death; and one has proved fatal at the end of six months, when serious disease in the shoulder had ceased. Let it be granted, however, that three cases were fatal, and that ordinary discretion was shewn in operating on subjects in whom pulmonic disease was more than suspected. Sufficient grounds will remain to warrant a repetition of the treatment. In all these instances, if excision had not been resorted to, the entire

* Syme on the Excision of Diseased Joints, *Edinburgh*, 1831.

† *Edinburgh Medical and Surgical Journal*, October, 1832.

limb must have been removed; and common opinion will decide, whether five successful cases out of eight amputations at the shoulder-joint would not furnish a very flattering proportion.

The elbow-joint, to which I now proceed, has been more frequently excised than any other. It is of almost equal importance with the shoulder-joint; is more subject to disease; and is less deeply imbedded in soft parts. The great evil in the excision of this articulation is, that the triceps, on which the extension of the fore-arm mainly depends, is divided, and is not likely to re-attach itself to the ulna. Dr. Jeffray of Glasgow thought that it would be possible, by omitting the transverse incision, and passing the needle of the chain-saw from one longitudinal incision to another, close to the fore-part of the humerus, to avoid the division of the triceps, when the ulna was not diseased; but it is manifest that the Doctor, who had operated only on the healthy joint, had not duly appreciated the induration, the swelling, and the difficulty of ascertaining the extent of the mischief, which render an operation on the diseased joint a matter of much difficulty, even as at present performed. Nor will the morbid anatomist fail to remember, that where the bones of the joint become affected, the olecranon is usually first attacked. The evil might, perhaps, be diminished, by making the transverse incision no deeper than to the surface of the triceps; and then, when the inferior flap is reflected, dissecting away the insertion of the triceps closely from the olecranon, so as to leave a long tendon connected to the muscle. In this way, the triceps would be half an inch or an inch longer than it would be if the knife were carried at once to the back part of the humerus, as it usually is in making the transverse incision; and if, after the operation, the limb were brought into as nearly a straight line as possible, the apposition of the bones would be somewhat closer, and there would be an additional chance of this important muscle re-inserting itself into the ulna.

The elbow-joint has been so frequently excised, that it would be alike useless and tedious to present an analysis of each operation: the following summary will be sufficient. The two Moreaus* record three cases, all successful; and state, that they operated several other times, and always with fortunate results. M. Roux† counts three cases, which have terminated favourably; and one which terminated unfavourably. Mr. Syme‡ numbers no less than nineteen operations, of which only two have been attended with unhappy results:

* Jeffray's Cases, &c.

† Revue Médicale, 1830.

‡ These cases will be found in Mr. Syme's Monograph on Excision; and in the Numbers of the Edinburgh Med. and Surg. Journal for 1832-3-4-5.

and Messrs. Key *, Crampton †, Champion ‡, Spence §, Simpson ||, and one of the surgeons to the Glasgow Infirmary ¶, can each furnish a successful case. The operation, it is said, has also been performed with fortunate results by Mazzozza, in Italy ; by Sommeillier, in France ; and by Mr. Beard of Newcastle, in this country : but as I have been unable to obtain any history of these, they will not be enumerated. Altogether, there are thirty-two, of which histories have been given. Of these, three have been fatal ; one patient dying at the end of five weeks, from the combined effects of phthisis and of an enormous abscess in the hip ; and the other two from accidents more immediately connected with the operation. Of the remaining twenty-nine, nearly all recovered the motion of the joint : in three or four it remained stiff and rigid, principally from neglect of the instructions given as to exercise. In no one of these cases was the constitutional irritation that followed alarming. All the patients had been suffering for many months, or for years : the most approved methods of treatment had been tried unsuccessfully : and in many instances, eminent surgeons had recommended amputation. In a few, the recovery was very rapid ; but in the majority, some months elapsed before the joint could be pronounced quite sound, as one or two small sinuses remained open, though occasioning no annoyance. The patients, in general, returned to their previous occupations. One of Moreau's was accustomed to use his arm in thrashing, ploughing, and the ordinary work of a farm : one of Roux's became a grinder in Paris, and, I believe, still follows his trade ; and one of Mr. Syme's wrote to him two or three years after the operation, to say that his arm was strong enough to carry eighteen or twenty pounds' weight with ease ; that he could raise six or eight pounds to his head ; and that he could write and perform any ordinary work, "so that no person would know," he says, "whether I had my elbow-joint, or was without it. 'I have even asked some people, whether they thought any thing was the matter with my right-arm ; and they answered, they could discover nothing.' " At the meeting of the British Association, held at Edinburgh in 1834, Mr. Syme produced several persons on whom the operation had been performed, along with the portions of bones removed : and I am informed, by our

Vide a preceding part of this Number.

† Dublin Hospital Reports, Vol. IV.

‡ Vide Velpeau's *Médecine Opératoire*, or, *Mémoires de la Société de la Faculté de Médecine*.

§ Syme on Excision, &c.

|| Edinburgh Med. and Surg. Journal, Jan. 1831.

¶ M'Farlane's *Clinical Reports of the Surgical Practice of the Glasgow Royal Infirmary*. Glasgow, 1832.

invaluable lecturer on morbid anatomy, Dr. Hodgkin, than whom there cannot be a more candid or competent judge, that he, and the other members of the Medical Section then present, were surprised and gratified by the strength and mobility which the new articulations had acquired.

Respecting the wrist-joint I have very few facts to offer. Roux is said to have excised it: but I have not met with a distinct account of more than one case; and in this, Moreau junior was the operator*. He confines himself to saying that the patient recovered, and possessed some motion of the fingers. The great number of tendons, nerves, and vessels which surround the joint; the rapid extension of caries among the spongy bones of the carpus, and along the base of the metacarpus; the almost inevitable danger of the tendons becoming glued together, or fixed to the surrounding parts, so as to render the fingers motionless; form most serious objections to the excision of this articulation. It may, however, be borne in mind, that the operation has been performed, and that extraordinary success has followed the removal of the carpal extremities of the radius and ulna, in compound dislocations. If it be attempted, both bones should be removed, though only one be diseased; as, otherwise, the hand will have a tendency to fall to one side.

The excision of the phalangeal articulations has been frequently performed, and with satisfactory results. Gooch states†, that he has sawn off the head of the second bone of the thumb, and that a new joint afterwards formed. Similar cases are given by Messrs. Roux, Wardrop, Bobe, and Evans.

In proceeding to speak of the lower extremity, I may be allowed briefly to recapitulate the reasons already urged, for believing excision less applicable here, than in the upper extremity; to wit, the large size of the articulations making the operation more dangerous; the resources of art to provide a substitute; and the uncertainty, even when the disease is removed, of having a limb so far corresponding in strength to its fellow, as to perform satisfactorily the functions, for the execution of which a combination of the two is necessary. If, indeed, bony ankylosis were to follow, this latter objection would be obviated; for the divided muscles, which must certainly form an attachment somewhere, would then act on the whole limb, and would probably be little inferior in strength, to those of the opposite side; while the shortening which takes place would be a positive advantage, as the manufacturers of artificial legs are well aware. Another evil, however, would arise from this state of things, if the

* Jeffray's Cases &c.

† Gooch's Cases and Remarks in Surgery.

anchylosis were of the knee-joint; as this immense bone, extending from the pelvis to the ankle, would be in constant danger of fracture. At the same time, it must be remembered, that a patient possessing the foot and ankle joint, even with a stiff knee, is in possession of a surer and firmer basis than art can contrive; that he is less liable to those sudden shocks and concussions which are always to be apprehended from a wooden limb; and that he walks, to use Mr. Park's language, "with a firmness, security, and satisfaction, which no artificial leg could give." If, therefore, excision should prove to be not more dangerous than amputation, these advantages may counterbalance the superiority which the latter possesses, in a more certain removal of the disease, and a more speedy cure.

The morbus coxarius is so intractable and fatal a disease, as to make it scarcely wonderful that the rash and perilous measure of excising the hip-joint should have been proposed and executed. When there is a conviction, amounting almost to absolute certainty, that the disease is confined to the head of the femur, the proposition may be feasible; and no one, possessing that bold wisdom which ought to characterize a surgeon, would hesitate to excise, when the head of the bone was shattered, and the joint exposed, by a gunshot wound or other accident. But in the immense majority of cases, the pelvic bones are affected, and the impossibility of removing the entire disease renders the measure indefensible. It would appear, however, from the Preface to Sir A. Cooper's work on Dislocations and Fractures, that Mr. White, of the Westminster Hospital, successfully removed the head of the femur from a carious joint; but the case is so briefly mentioned, that no opinion of its merits can be formed. A few years ago, the same experiment was tried by Mr. Hewson of Dublin*, the femur being sawn through, a little above the trochanter minor: but the patient died in the course of three months; and, on examination, large purulent collections were found extending into the pelvis, through an opening in the cotyloid cavity. It is said that the analogous operation of separating the head of the femur from the pelvis, where bony anchylosis had taken place, has been twice tried in America, and once with success.

As the knee-joint is more frequently diseased than any other, it were much to be wished that there were sufficient warrant for venturing on its excision; but the immense size of the wound that must be inflicted, and the complete envelopement of the articulation in tendinous structure endowed with a low degree of vitality, and little capable of maintaining a healthy reparative process, are, to say the

* Hargrave's Operative Surgery.

least, untoward circumstances. Other arguments, having the same tendency, might be urged, in addition to those applicable to the lower extremity in general; but the facts to be presented are sufficiently decisive. We have histories of eleven cases.

CASE 1.—The first is that of Mr. Filkin of Northwich*; but of this, the details are imperfect. He removed the patella, the condyles of the femur, and the head of the tibia: the patient recovered completely in three months, and lived for many years—with what sort of a limb, is not mentioned.

CASE 2.—Mr. Park* operated, in 1781, on a sailor, whose knee had been diseased for ten years. Two inches of the femur, with one of the tibia, and the entire patella, were removed. Great constitutional irritation followed, but the patient survived; and though his complete recovery, being protracted by an accidental injury, occupied twelve months, he ultimately went to sea, with a strong and useful limb; and made several voyages, during which he performed all the duties of a common sailor; could go aloft with considerable agility; and suffered great hardships in two shipwrecks, without any return of the disease. The bones were united by osseous ankylosis. The limb was three inches shorter than the other, and slightly bowed outwards; but, with the aid of a high-heeled shoe, he walked easily and firmly.

CASE 3.—In Mr. Park's second case†, the disease of the knee was scrofulous caries of the bone, of three years' standing. When the operation was performed, there was a large abscess extending down the leg for some inches. For a month, every thing went on satisfactorily; but, at the end of that time, diarrhœa and hectic set in, and in the course of a few weeks the patient sank.

CASES 4, 5, 6.—The Moreaus operated three times under circumstances very similar to those of Mr. Park's patients. The first case appeared to proceed favourably for some time; and the bones became so well consolidated, that, when the patient attempted to move the thigh, the leg turned with it. At the end of three months he began to move about, on crutches; but at this time he was seized with an epidemic dysentery, and carried off in fifteen days. In another case, the result was more speedily unfortunate: and the subject of the third operation was for a long time unable to move without crutches, though, in the end, the limb became serviceable.

CASE 7.—In 1809, Mûlder‡ operated on an adult female, in whom

* Jeffray's Cases, &c. † Ibid.

‡ Dissertatio de Articulis Extirpandis, auctore G. Wachter. Gröningen, 1810.

the disease had been of long standing. Great irritative fever followed, at the end of nine days. This patient, however, had not a fair chance; for two months after the operation, when she was suffering intensely from the knee and from hectic, she was delivered of twins. She died at the end of fifteen weeks. The extensors of the leg were found to be adhering firmly to an osseous apophysis, which jutted over the inferior extremity of the femur: the flexors were connected to the tibia at the usual place: there were one or two collections of pus beneath the muscles, and a cavity between the bones. A good deal of callus had been thrown out; some of which, as well as part of the original femur, appeared to be affected with caries.

CASES 8 and 9.—Mr. Crampton of Dublin has published two cases*. In his first case, the bone was most extensively diseased; and three or four inches of the femur were removed, along with the patella and the head of the tibia. No constitutional disturbance succeeded; and the patient was at length discharged, though with a very inefficient limb. In the year following, she returned to the hospital, with the old sinuses re-opened; and at the end of little more than three years, she sank from repeated attacks of erysipelas and formations of abscess.—Mr. Crampton's second case was more fortunate. The disease was of four years' standing, and hectic had come on. Only the femur and patella were removed, as the tibia was sound. In three months, the wound was completely healed; in six, she could walk on crutches; and in the end, she could walk or stand the whole day. The bones were united; the limb was considerably bowed outwards; and there was so much shortening, that she required a shoe with a cork sole four inches thick.

CASES 10 and 11.—The most recent operator is Mr. Syme†. His first patient was a boy, who had been suffering under caries of the knee-joint for three years. All the articulating surfaces were removed. In four weeks, the wound had completely healed: at the end of three months he began to make use of the limb in walking; and ultimately could walk and run with surprising agility. The most remarkable feature in this case is, that the bones were moveable one upon another, and there was some flexion and extension. In the *Edinburgh Medical and Surgical Journal* for April 1832, Mr. Syme states, that this boy, two years after the operation, could, by his own efforts, flex the leg to a right angle with the thigh.—Mr. Syme's second case was very unfortunate. The disease proved much more extensive than had been anticipated; and at the end of ten days, the patient died.

Facts like these require little comment. Of eleven operations, five

* Dublin Hospital Report, Vol. IV. † Syme on *Excision*, &c.

have entirely failed; one partially: and in the remaining five, though life was preserved, the recoveries were long and tedious. With whatever truth the results of the fatal cases may be assigned to accidental causes, it must be remembered, that these accidental causes apply equally to any other operation; and in forming an estimate, it would be unjust to make an exception to the rule which classes all cases not followed by recovery as instances of failure. The excision of the knee-joint is, therefore, a measure against which experience strongly militates. Occasionally, where the health is little affected, the disease unquestionably circumscribed, and the importance of the limb extreme—or where the patient is obstinately determined not to submit to amputation, and a fatal result is certain if the joint be not removed—the operation may be admissible; but, except in such rare contingencies, the surgeon who shall undertake it will deserve censure for his rashness, rather than applause for his enterprise.

There are only, so far as I know, two instances of the excision of the ankle-joint on record. Both of these are furnished by the Moreaus*. In the first case, all the articulating surfaces, being in a state of confirmed caries, were removed. Some fever, and a profuse discharge, followed; but in six weeks the wound was nearly healed, and the foot did not require to be supported when it was dressed. Six months elapsed before the patient was able to bear any weight on it: in seven, he began to move about on crutches: in eight, he required only a stick; and at the end of the ninth month he could walk unassisted. The foot was drawn up to the leg, and the limb about an inch shorter. There was no new joint between the tibia and astragalus; but such motion in the tarsal joints, that, with a high-heeled shoe, the patient walked without halting.

In the second case, the bones were less extensively carious; and the fibula was left untouched, while a considerable portion of the tibia was removed. Owing to imprudent exertions on the part of the patient, the cure was a very long one; and, in the end, he could only walk on the outer side of the foot. The tibia and astragalus were united by bone.

Where the disease is confined to portions of the three bones forming the articulation, no unanswerable objection to this operation can be urged. That it is one of great difficulty, may be conceded; but the Moreaus have already shewn it to be practicable; and it is well known, that, after sawing off the extremity of the tibia in compound dislocations, a very serviceable foot has been retained. The tarsal bones acquire a free motion one upon another, so as to make the

* Jeffray's Cases, &c.

rigidity of the tibio-astragalar articulation less inconvenient. It must not, however, be forgotten, that, in a large portion of the cases which pass under the name of diseased ankle-joints, several bones of the tarsus are affected ; and if excision were generally practised, the probability is, that frequently the patient would undergo a severe operation, without the slightest benefit.

These are all the facts which I have to offer. From a careful review of them, the following conclusions seem to be deducible :—

That excision is advisable in the shoulder and elbow ;—that it is admissible, though of doubtful utility, in the ankle ;—and that it is inadmissible, except under very peculiar circumstances, in the wrist, hip, and knee.

That the constitutional irritation occasioned, is, in general, slight : even those who have not recovered, have, for the most part, lingered through many weeks or months.

That, commonly, no vessel requires a ligature ; and the loss of blood is inconsiderable. One of M. Roux's patients died from secondary hæmorrhage ; but this is a solitary exception.

That the danger of excising the joints of the upper extremity and the ankle joint, which are all those to which the treatment seems applicable, is not greater, and probably less, than that of amputation. Of forty-two cases, only five were fatal.

That the disease, in almost all instances, is eradicated. The only exceptions to this statement are to be found in the operations of Mûlder, Crampton, and Syme, on the knee-joint. In every other case, the patients have died from the effects of the operation, and accidental circumstances ; or have made a permanent recovery.

That the wounds made in performing the operation heal rapidly, though the cure is often retarded by a succession of small abscesses.

That two or three of the old sinuses may be expected to remain open for many months, though the tenderness and swelling continue to subside. They create no uneasiness ; and the discharge from them is scarcely noticeable. Occasionally, they are produced by the exfoliation of small scales of bone ; but more commonly they are to be attributed to the want of reparative action in the morbid structures through which they pass. "They invariably," says Moreau, "heal up, in a longer or shorter time, and never open again."

That the bones of the shoulder and elbow will be united by ligamentous tissue, so as to form a moveable joint. In one of Mr. Syme's patients, who died of another disease long after recovery from the operation, the humerus was found to be united to the ulna by a strong fibrous structure, closely resembling ligament ; and to this the triceps was attached.

That the excision of the knee and ankle joints, after which the bones are almost necessarily brought into close connection, will be followed by bony ankylosis. Mr. Syme's is the only case in which this has not been the result.

That mobility of the shoulder and elbow joints may always be secured, with proper attention. Two of Mr. Syme's patients had stiff joints; but it was owing to their obstinacy, in refusing to exercise the limb, or to admit of passive motion.

The facts and arguments by which excision is defensible have been now stated; and it remains for the Society to pronounce its opinion on the merits of the proposal. Many of the objections to the measure have been incidentally discussed in the preceding observations; and it would be a needless repetition to canvass them again. Its superiority to amputation is evinced, by the preservation of a useful limb, without the infliction of greater danger; and any other arguments that may be urged against it are only applicable, on the supposition that some remedy for the disease exists. Whenever that remedy is discovered, excision may be forgotten; but until then, we may conclude it to be an operation of great value in the hands of a discreet surgeon. That it is attended by many and inseparable evils, it were untrue to deny; but, until we have some better method of treatment to offer, there can only be drawn, from a knowledge of these evils, the practical inference, that it is our duty to interrogate disease more closely than we have hitherto done, if, by any means, remedial agents may be discovered which shall restore a carious articulation to its normal state. Let it ever be remembered, that excision is proposed, not as a cure for diseased joints, but as a substitute for amputation.

